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PROGRESS REPORT

CONTROL WORK AND INVESTIGATIONS, SEQUOIA NATIONAL PARK

SEASON OF 1919

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ASHLAND, OREGON
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PROGRESS REPORT

CONTROL WORK and INVESTIGATIONS

SEQUOIA NATIONAL PARK

Season of 1919

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Summary

The field work on this project was resumed by Entomological Ranger Albert Wagner on Apri- 27. With the exception on one interruption from May 26 to June 7 when a trip was made to the Santa Barbara National Forest his time was given over entirely to insect control investigations and seasonal history records on the Sequoia National Park.

An examination was made of Unit 10 in May by J.M.Miller to check up the results of the 1918 control work. The data from this examination was included in the 1919 Ashland Conference report, and shows a reduction of from 60 to 80 percent in the amount of infestation during the season following the initial control project. No further control work was attempted on this unit as it was decided to follow the course of the infestation following the 1918 control work for several years without disturbance.

As indicated in the report of January 3,1919 the amount of overwintering 1917 infestation removed from Units 11 and 12 was not considered sufficient to control the infestation in these two basins In Unit 12(Cactus creek) the infestation in 1918 increased over that of 1917, but in Unit 11(Marblefork) where the control work was carried on over about 20 percent of the area there was a decline in the volume of infestation in 1918 from that of 1917 of about 42 percent in yellow pine and 20 percent in sugar pine.

The control work which was undertaken during the season of 1919 was carried out upon an entirely different basis from anything heretofore attempted. Funds were not available for a general attack upon the overwintering 1918 infestation upon either unit. Realizing that it might be hazardous to garauntee the results of an incomplete control project it was decided to confine the work of this season to experiments with the use of trap trees as recommended by Dr.Hopkins in Bulletin 58.

This experimental work was confined to Unit 11. The original plan was to cut trap trees a short intervals throughout the season and study the character and amount of infestation attracted to them. The purpose was to develope the techniquee of selecting and treating trap trees, so as to lay the ground for a later attempt at maintainging control by the use of this method. It was considered best to thus limit the work for 1919 as no funds were in sight for carrying on control work after July 1st, and it was also thought that as the D.brevicomis traps would have to be burned, the fire danger would make it impossible to carry on the experiment on an extensive scale.

During the summer Mr.Wagner discovered that by the use of powder, which was supplied by the Park, he could fell both standing infestedа and trap trees singlehanded without employing temporary labor. He also discovered that the breviconis broods were being killed wherever the infested bark was peeled and exposed to the sun without burning. At the same time it was found that the attraction of the traps was sufficient to attract strong broods of Dendroctonus beetles in almost all cases. As a result the amount of trap trees was considerably increased and by the close of the season practically all of the infestation on the unit had been attracted to the traps.

The majority of the infested standing trees and traps were treated. The trap trees which were attacked late in September and October however were left for treatment in the spring of 1920 as the bark hadchot loosened sufficiently to make treatment easy during the fall period.

The merits of the trap tee experiment will be discussed in one of the follwoing sections of this report. Conclusions as to its results however cannot be drawn until the area has been studied in the spring of 1920 when the treatment of the traps will be completed. The exact amount of the 1919 attack in standing trees will not be evident until the spring of 1920.

Costs.

Aside from Mr.Wagner's salary and expenses the follwoing expenditures were made:

By the Bureau of Entomology,
Temporary from June 1 to June 30, - - - - $120.
By the Sequoia National Park,
Temporary labor from July 1st to Nov.10--- 125.
Total $ 245.

The Sequoia National Park made available a fund of $500. for insect control during the fiscal year 1920. Of this amount there remains a balance of $375. to be expended in the spring of 1920. It is considered that under the syatem which is now being used that this amount will be sifficient to complete control work on units 11 and 12.

Status of Infestation

The progress of the infestation to date from records now available is shown in the table on page 3. This is also shown in diagramatic form on page 4.

The progress of the infestation on unit 10 is also shown in the diagram on page 5. The 1919 records for this unit are not available as the examination recording this loss will not be made until the spring of 1920.

II. Experimental Work With Trap Trees.

Selection of trap trees .

Fairly large trees were selected for this purpose their average diameter being equal to the standing infested tree treated on the area. As a rule the following points determined the selection of trees for this purpose:

1. Windfalls of preceeding winter. These were realtively scarce this season, only one being found (Tree #C1). It is evident that windfalls can be utilized for this purpose but they are difficultyto findand during some seasons none occur.

2. Topkilled trees. The majority of the trap trees selected in sugar pine were topkilled trees. All available topkilled yellow pine were also used for traps. Usually the attraction of a topkilled tree is sufficient to draw a second attack even if left standing. By felling however it is possible to control this attack. The injury resulting from topkilling makes them undesireable in any case from a silvicultural standpoint.

3. Suppressed trees. Those crowded and out-topped by surrounding trees so that they cannot make a thrifty growth.

4. Badly fire injured trees. Those with heavy butt scars which are in danger of falling or are weakened by heart rot developing from the injury.

5. Decadent trees, unable to maintain normal growth and functions because of overmaturity, disease or other causes.

6. Trees felleddin construction work by road crews, etc.

In addition to these considerations the site or location of the trap tree also had a bearing upon its selection. As a rule all traps are selected within easy reach of available roads. As the experiment was located within the National Park, the traps were also located where they would not be conspicuous or in anyway mar the natural beauty of the forest. As the timber within this unit constitutes a very heavy stand this consideration was easily provided for.

Attraction of trap trees.

The attraction of yellow pine traps to D.brevicomis and sugar pine to D.monticolae was consistent throughout the season. In a few cases occasional D.monticolae galleries were found on the under side of yellow pine logs. In no case however was D.brevicomis attack found in sugar pine traps.

The progress of the attacks in a representative series of

representative yellow pine and sugar pine traps is shown by the chart on page 8 & 9. As to the period between the date of felling and the first attacks recorded we have the following:

	Yellow pine (D.brevicomis)	Sugar pine (D.monticolae)
Period between felling and attack: no.days		
Minimum	4	4
Maximum	18	19
Average	10.5	7.5

In general the period between felling and attack was somewhat longer during the earlier part of the season in May and June, shorter during the mid-summer period in July and August. Toward the close of the season in September and October this period was again somewhat longer and the attacks developed slowly.

Trees felled after the 20th of October had not developed an attack up to November 12th. It is probable however that these trees will draw and attacks in the spring of 1920.

With few exceptions all trap trees attracted heavy broods up until October 15th. It was noted however that trees which were felled where the greater part of the trunk was exposed to the sun did not attract full broods. The top of the trunk was not attacked at all under these conditions, altho the shaded under portions of the log drew the normal amount of infestation. The most successful traps were those felled so that the trunk was shaded or partially shaded during the heat of the day. This point was discovered early in the season and nearly all traps were felled in shaded locations.

In only two cases were standing green trees attacked in the vicinity of traps. One of these was near the overwintered windfall. The danger of aggravating the infestation in standing green trees because of the use of traps therefore appears to be negligible.

Influence of traps upon the existing infestation.

In the table on page 10 a comparison is shown between the amount of infestation which developed in the standing green trees and that which developed in the traps for the entire unit. This is also shown in diagrammatic form on page 10. This shows that during the early part of the season the greater volume of infestation was attracted to standing green trees, but toward the close of the season this condition was reversed and by its close nearly all of the infestation on the unit had been drawn into the traps. This may have been due to the fact that the felling of trap trees was increased during the summer thereby increasing the volume of timber available for attraction.

It is planned to complete the treatment of trap trees left last fall when the work is resumed in the spring of 1920. It is confidently believed that the amount of infestation on unit 11 will then be reduced to a very low point unless the greater part of the overwintering infestation is at present concealed.

Considerable significance can be attached to the progress of the infestation on the adjoining Cactus Creek watershed (Unit 12)

KAWEAH AREA- UNIT 11

Summary of annual loss for 1919 by bi-weekly periods showing comparison of volume of infestation attracted to standing green trees and felled trap trees.

Period	YELLOW PINE				SUGAR PINE			
	standing trees		trap trees		standing trees		trap trees	
April 1st to May 1st. overwintering trees	No.trs.	Vol.	No.trs.	Vol.	No.trs.	Vol.	No.trs.	Vol
treated					4	11,900		
untreated	27	70,800			41	142,780		
MAY								
1 - 15	1	1,500	1	120			1	450
16 - 31	2	4,200					2	88920
JUNE								
1 - 15	2	1,520	6	77090	10	44,500	1	2,000
16 - 30	2	3,860	2	7,860	2	7,260	4	32,620
JULY								
1 - 15	2	1,570	3	9,150	8	13,140	6	18,970
16 - 31	2	3,860	2	7,860	2	7,260	4	32,620
AUGUST								
1 - 15	4	8,780	4	5,280	6	21,070	3	11,340
16 - 31	3	9,080			2	3,420	3	16,160
SEPTEMBER								
1-15					4	5,080	2	3,280
16 - 30	4	10,920	4	10,920			9	35,850
OCTOBER								
1 - 15	1	1,280	1	1,720	1	1,440	2	3,420
16 - 30								

during the season of 1919. On this unit there was a pronounced drop on the volume of both yellow pine and sugar pine infestation while the trap tree experiments were in progress. This decline in 1919 followed and increase in 1918 as shown by the diagram on page 4. It has been shown in preceeding reports that the two units are nor separated by any distinct or effective barrier. Apparently the traps attracted a considerable amount of the infestation on unit 12 as well as unit 11, which would account for the decrease of the infestation on unit 12 altho no control work as carried out within this watershed until the close of the season.

Advantages of Trap Tree Method.

As already stated the results which can be expected from the use of this method are not as yet evident, but certain advantages which it possesses over former methods used can be stated as a result of the experience of this season.

1. Accessibility of trees to be treated.

Unit 11 is traversed by a good road which crosses the Marble for basin. Trap trees were selected a convenient points above or below this road. By the use of a jitney it was possible to return quickly to the felled trees for examination or treatment. This made it possible for Mr.Wagner to accomplish the amount of work which he did during the season. It is evident that similar conditions affording accessibility can be found on almost any unit of accessible timber.

2.Treatment of broods at the proper stage of development.

After a trap tree is felled the date when the brood will be in the right condition for treatment can be fairly definitely predicted. This should be about the time that the larvae are half grown. In treating standing infested trees it is frequently found that when the brood near the base is in the proper stage for treatment,the upper part of the trunk will be nearly or entirely abandoned. This irregularity of development was not encountered in the traps.

3. Ease of peeling.

Bark infested by broods in the early stages of development does not peel from standing trees and has to be scored. Peeling has been found to be one of the largest items of expense on control projects. It was found in the yellow pine trap trees that the bark loosened about the time that the brood reached the halfgrown larval stage so that it could be removed with little effort. This was found to be one of the greatest advantages resulting from the use of the trap tree method.

4. Utilization of trees felled in road and construction work.

Trees felled for contruction purposes during the season were watched and treated at the proper time. Whereever work of this character is going on it provides an opportunity to utilize felled trees for traps as a measure for holding the infestation under control.

III. Brood Records.

Overwintering Broods.

For the first time records are now available from the locality showing the brood periods in overwintering trees, beginning at the time

of attack in 1918 and ending with the last emergence the following spring. These records clear up some of the puzzling features connected with overwintering trees previously observed in this region.

The yellow pine brood records for D.brevicomis are shown in the chart on page 13. We have in tree No.B51 a maximum brood period extending from attack and first eggs on August 5 to the last emergence on June 18, approximately 318 days. From first eggs to first emergence we have a period of 278 days. This corresponds with only minor variations to the brood periods recorded in 5 other overwintering trees.

In tree No.B60 the attack and first eggs were recorded on September 29, and the first emergence on May 19, a period of 231 days; the last emergence on June 18, a period of 262 days. In this tree the attack occured later than in any of the others recorded, but the broods appear to have caught up with the earlier attacks so that emergence occured during about the same period in the spring. From a practical standpoint these records are of valur in showing that trees attacked after the 5th of August as a rule pass through the overwintering period.

For D.monticolae in sugar pine we have records from two overwintering trees only, copies of which are shown on page 14. The brood periods correspond closely to recorded for D.brevicomis in yellow pine.

Summer Brood Trees

Records showing development of the first seasonal generation or s summer broods are shown in the trap tree charts on page 8 and 9.

In the more satisfactory records from D.brevicomis trees we find that the maximum brood periods approximate 60 to 75 days. These correspond closely to the records obtained by Mr.Patterson in 1919 from the Yosemite Valley. In general it can be fairly definitely stated that trees attacked in June are abandoned in August; those attacked in July are abandoned in September; but it is apparent that the majority of trees attacked after the 5th of August pass through the overwintering period and are not abandoned until the following spring. This applies to the yellow pine belt of this region at elevations ranging from 4500 to 6500 feet.

In the D.monticolae records from sugar pine we have maximum summer brood periods extending from 60 to 90 days with considerable variation in individual trees. In general however trees attacked in June are abandoned in August and September; trees attacked in July are abandoned in September and October; while trees attacked after August 1st pass through the overwintering period.

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Ashland, Oregon.
January 22, 1920.